

Improved technology facilitates new scientific opportunities: Implementation of an on-board flow cytometer as part of the LifeWatch marine observatory

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Monitoring phytoplankton in the Belgian part of the North Sea on a near-continuous basis can yield valuable information on the ecological status of these waters. The use of a flow cytometer can improve this understanding and increase the efficiency of analyses and reporting. Flow cytometry is a commonly used technique among biologists to study temporal and spatial changes of phytoplankton species composition and abundance. It creates fingerprints of particles (phytoplankton cells) based on their ability to scatter or re-emit specific wavelengths of light. This light is picked up by detectors and by analysing fluctuations in brightness it is then possible to derive information about the physical and chemical structure of each individual particle.

In the framework of LifeWatch a CytoSub flow cytometer has been installed on board of the RV Simon Stevin where it is connected to its continuous water flow system. The instrument is designed to analyse the naturally occurring size range from small (e.g. picoplankton) to large (e.g. colonial) plankton species (1 to 800µm). In addition to its ability to gather flow cytometric data, the instrument can also take pictures of individual particles. This allows easier identification of particle clusters. The embedded computer of the CytoSub is connected to the network of the RV Simon Stevin, which allows off site operating the instrument via a remote desktop connection.

The high frequency of analysis with respect to more traditional approaches, enables to collect and evaluate much more information about the microbial planktonic dynamics in the marine realm up to a single cell level. High-throughput flow cytometric data generated during the RV Simon Stevin campaigns are automatically processed with specifically designed software. Resulting figures are transferred via the ship's satellite connection and are near-real time visualised online.

This setup is part of the LifeWatch marine observatory. LifeWatch supports biodiversity and ecosystem research by building an infrastructure that allows researchers to communicate, share data, analyse results, create models, manage projects and organise training. The collected data within this framework will be made available for the scientific community.